MODIS Chlorophyll a Pigment Concentration (MOD 21) and Absorption Coefficients (MOD 36)

Product Description

This is a Level 2 and 3 product which contains ocean chlorophyll *a* pigment concentration for Case 1 and Case 2 waters at 1-km resolution. It is produced daily at Level 2 and daily, 8-day weekly, monthly, and yearly at Level 3. Absorption parameters generated by the chlorophyll algorithm are also provided as the intermediate product MOD 36, Absorption Coefficients, which includes absorption due to water, phytoplankton, detritus, and gelbstoff, and gelbstoff absorption only. Valid data exist only for ocean cloud-free pixels and the weekly composite will be an average of cloud-free acquisitions for each ocean pixel.

Research and Applications

Chlorophyll *a* concentration is a key input to the Ocean Primary Productivity product (MOD 27) and is used to trace oceanographic currents, jets, and plumes. The product provides the concentration of chlorophyll in Case 1 sea water (water that has optical properties that are dominated by chlorophyll and associated covarying detrital pigments) and in Case 2 waters (waters that contain substances that affect optical properties but do not covary with chlorophyll, such as gelbstoff (marine chromomorphic dissolved organic matter [CDOM] substance that absorbs at 400 nm), suspended sediments, coccolithophores, detritus, and bacteria). The algorithm derives from extensive research using CZCS data in which good performance was obtained for Case 1 waters and has evolved to perform successfully for the Case 2 waters for the MODIS algorithm. The 1-km resolution and nearly daily coverage will allow the observation of mesoscale oceanographic features in coastal and estuarine environments, which are of increasing importance in marine science studies.

Data Set Evolution

The product algorithm is based on a semi-analytical, bio-optical model of remote sensing reflectance which uses Water-Leaving Radiance (MOD 18), PAR (MOD 22), and Absorption Coefficients (MOD 36). The model is inverted to obtain the absorption coefficient due to phytoplankton at 675 nm, and chlorophyll *a* concentration is derived from this coefficient. The algorithm will be thoroughly tested during the SeaWiFS project, and post-launch validation will be conducted using data from instrumented collection cruises through ocean test sites including the nine used for algorithm development. Also, hyperspectral data will be used to simulate the 10-nm bands and produce comparison results.

Suggested Reading

Austin, R.W., 1974.

Carder, K.L. *et al.*, 1986.

Carder, K.L. *et al.*, 1991a,b.

Holm-Hansen, O., and B. Riemann, 1978.

Lee, Z.P. *et al.*, 1996.

Smith, R.C., and K.S. Baker, 1982.

(MODIS Chlorophyll a Pigment Concentration and Absorption Coefficients, continued)

MODIS Chlorophyll *a* Pigment Concentration and Absorption Coefficients Summary

Coverage: Global ocean surface, clear-sky only

Spatial/Temporal Characteristics: 1 km/daily (Level 2); 4.6 km, 36 km, 1°/daily, 8-day, monthly, yearly (Level 3)

Key Science Applications: Ocean productivity, bio-optical properties

Key Geophysical Parameters: Case 1 and 2 chlorophyll *a* concentration, absorption coefficients

Processing Level: 2, 3

Product Type: Standard, at-launch

Maximum File Size:
MOD 21: 83 MB (Level 2); 640 MB binned, 134 MB mapped (Level 3)

MOD 36: 102 MB (Level 2); 865 MB binned, 134 MB mapped (Level 3)

File Frequency: 144/day (Daily Level 2); 2/day (Daily Level 3), 2/8-day (8-day Level 3), 2/month (Monthly Level 3), 2/year (Yearly Level 3)

Primary Data Format: HDF-EOS

Browse Available: 36 km sample imagery available at the Goddard DAAC (Level 3 only)

Additional Product Information:
http://modis-ocean.gsfc.nasa.gov/dataprod.html

DAAC: NASA Goddard Space Flight Center

Science Team Contact:
K. Carder